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| **Lesson Title: Math Pedagogy** |
| **Subject area / course / grade level: 4th grade math** |
| **Introduction:** This lesson is designed to focus on understanding the concept of variables in mathematical expressions.  Students will also learn how to use variables in expressions and simple equations. This lesson will be completed after a lesson on order of operations, which will be revisited briefly. |
| **Lesson Length: 60 minutes** |
| **Materials: ELMO camera, smartboard, input/output template, “guess my rule” smartboard game, math journals.** |
| **Lesson Overview:**  **Students will begin the lesson by participating in a teacher created “guess my rule” game on the smartboard with input/output tables. Students will be asked to place the rules and input/output information into a numerical expression.** |
| **Tennessee Standards:**  GLE 0506.3.1 Understand and use order of operations.  GLE 0506.3.2 Develop and apply the concept of variable.  GLE 0506.3.4 Solve single-step linear equations and inequalities. |
| **Lesson objective(s):**   1. **The students will be able to determine rule in input/output tables.** 2. **The students will be able to use the “missing rule” to write numerical expressions.** 3. **The students will apply information to solve for a variable in a numerical expression.** |
| **ENGAGEMENT**   * The lesson will open with students participating in a teacher created input/output table game on the smartboard.   “What rule can we apply to the tables that will be true for each row?” |
| **EXPLORATION**   * Using the input/output tables, students will take the rules discovered and rewrite the numerical expressions using variables. * 4th grade students are often intimidated by the idea of a “variable”, in the exploration portion of this lesson, we will show that the variable can be interchangeable. Explore the use of shapes/letters in the variable position. Ask students if changing the variable changes the value of the expression in any way. |
| **EXPLANATION**   * Students will be asked to apply this knowledge to numerical expressions with variables. They will be asked to solve several independently after doing two examples as a whole group. * Students will be asked to explain steps taken to solve problems, and explain why they chose each operation to solve. (ie-opposite of operation in the expression, recalling of basic math facts, ect) * Other questions: “Why do we use a variable?”, “Why is it important to find the variable’s value?”, “What words are new to us today?” “Can we apply order of operations to this lesson? How?” “Why are order of operations important when working with variables?” |
| **ELABORATION**   * Students will add academic vocabulary related to the lesson into their math vocabulary journals. They will explain the vocabulary in their own words, give an example, and draw a representation of the vocabulary. * Students will create their own input/output table and trade within their small math group (ability grouped) |
| **EVALUATION**   * Students will have notes in their math journals. * A self guided center activity will be completed later in the week to assess students understanding of concept. |